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DECEMBER, 1915.

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Juan Gundlach, 1810-1896.

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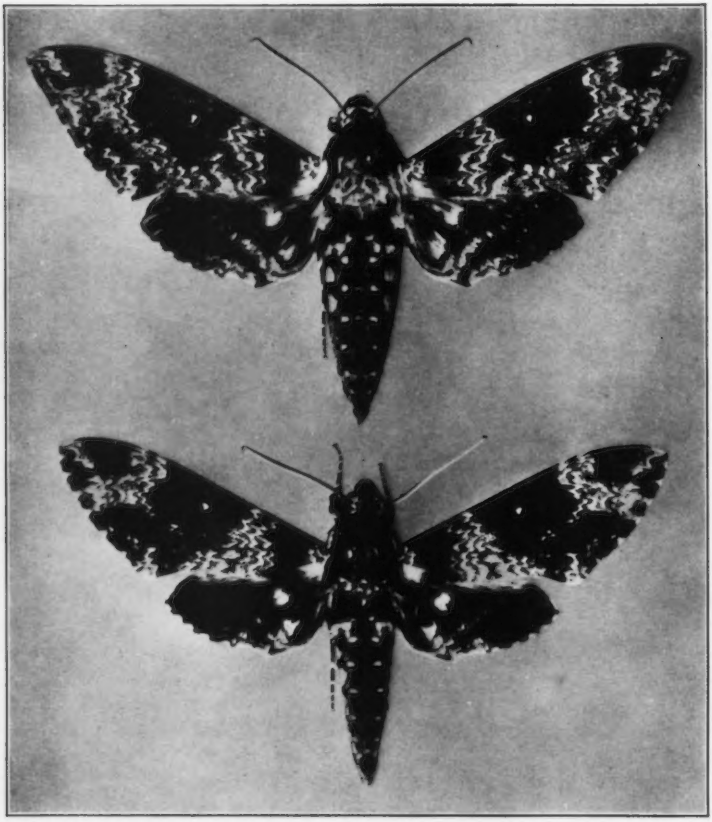

PROTOPARCE RUSTICA—WOOD.

UPPER FIGURE—MALE, NELSON COUNTY, VA.

LOWER FIGURE—MALE, GUANTANAMO, CUBA.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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The Cuban Variety of Protoparce rustica Fabricius (Lep.).

By WILLIAM C. WOOD, New York.

(With Plate XIX)

The multiplication of mere varietal names is usually undesirable, although in somes cases, such as *Junonia coenia* var. *negra*, or *Pieris monuste* var. *phileta*—simple color varieties—a name may be a convenience.

Local variations would, however, seem better entitled to distinctive names. This is true especially when the points of difference are constant; when they are present in all the individuals from a particular region; and, above all, when they are not found in individuals from any other locality.

For many years I have realized that specimens of *Protoparce rustica* from the island of Cuba look different from the usual type. Such perceptions are often more or less instinctive and unreasoned. Merely as an example, take the case of two other species of *Protoparce*—*pellenia* and *scutata*. They are so similar in pattern and coloring that it would be very hard to differentiate them by a written description, yet there is little difficulty in separating them once they are known.

Protoparce rustica Fabr. is found throughout the Nearctic

and Neotropical regions, approximately between the parallels of 40 N. and 40 S. Specimens from continental North and South America are all practically alike. There is no marked variation in color or in pattern. Local races from certain island regions are, however, more or less distinctly variant. In the Galapagos Islands we find *P. rustica* var. *calapagensis* Holl., and in St. Lucia, var. *harterti* Roths.

Cuban specimens differ from the typical form, chiefly in having the grey disco-marginal banded areas of the fore wings interrupted between nervures R3 and M2, the ground color of the wing extending to the margin, with a mere trace of white marking. I have so far examined sixty specimens, twelve from Cuba, and forty-eight from the United States, Mexico, Central and South America, and Jamaica. This series is not large, but the species is not subject to much individual variation. *Without exception* the specimens from Cuba are as described below and shown in the accompanying Plate XIX (lower figure), and those from all the other localities are alike; the typical form, shown in the upper figure of the Plate. (It is interesting to note that the Jamaica specimens are of the usual type.) Is it not therefore fitting that a sub-specific name be given to the Cuban race of this species?

I would propose—

Protoparce rustica cubana. Subspec. nov.

Wings, above—Forewing: the first whitish discal line is interrupted a short distance below nervure R^2. The broad brownish-white discal band becomes obsolete between R^3 and M^2, to reappear as an indefinite patch at the hind angle. The wing and body are less sprinkled with grey scales, generally, and the ground color and whitish markings contrast more strongly. The black lines are less evident than in the typical form. Hindwing—Not noticeably different.

Underside of forewing resembles typical form, except that the space between second and third discal lines is lighter than the ground-color, and on hindwing the discal lines are more curved, and nearer the margin. Both wings slightly narrower than in the typical form.

Types, one male, one female, Guantanamo, Cuba (Ramsden), Author's collection.

Paratypes, 3 males, 1 female, ibid.; 1 female, Santiago, Cuba, Author's collection. 4 males, 1 female, Cuba, Am. Mus. Nat. Hist., New York.

(No Cuban specimens in other collections seen.)

Studies on Costa Rican Odonata.

VII. The Waterfall-Dwellers: The Internal Organs of Thaumatoneura larva and the Respiration and Rectal Tracheation of Zygopterous Larvae in general.

(Continued from page 395)

By PHILIP P. CALVERT, PH.D., University of Pennsylvania, Philadelphia.

Our knowledge of the whole subject of the respiration of Zygopterous larvae is still very indefinite, and it seems worth while to summarize it such as it is.

CLASSIFICATION OF THE TRACHEAL GILLS OF ODONATE LARVAE.

Dufour (1852), grouping all the Odonate larvae known to him under the four genera, *Aeshna, Libellula, Calopterix* and *Agrion,* gave as generic characters for the first three "Branchies intérieures ou rectales," and for the last "Branchies extérieures ou *caudales* . . . et servant aussi de *nageoires.*" He added "Comme on voit, la nature et la position des branchies établissent entre le *Calopterix* et *l'Agrion* une distance anatomique énorme" (p. 72). Hagen (1853), recognizing five families, gave for Libelluliden, Gomphiden and Aeschniden "Darmkiemen," for Calopterygiden "Darm und Schwanzkiemen," for Agrioniden "Schwanzkiemen" (pp. 261-9, 311). Rousseau (1909, pp. 2, 43, 45) has accepted the same distinctions so far as "branchies" are concerned.

Roster (1885, p. 259), on the other hand, grouped *Agrion, Lestes* and *Calopteryx* as Caudobranchiati, *Anax, Libellula* and *Aeschna* as Rectobranchiati, although Dufour (1852, p. 83) had employed the same words, in the form of French adjectives, in the different sense implied by his classification quoted above. Roster's terms were synonymous, as group names, with the earlier Zygoptera and Anisoptera and were so recognized by systematic writers.*

FUNCTIONS OF THE THREE CAUDAL APPENDAGES OF ZYGOPTEROUS LARVAE.

Réaumur (1742, p. 405), who regarded these appendages as "nageoires" (fins), and Roesel von Rosenhof (1749, pp. 41 et

E. g., de Selys-Longchamps, Ann. Soc. Ent. Belg. xxxi, pp. 75, 80, in a "Liste des Odonates d'Europe en 1887."

seq.), who termed them "Ruder-Federn" (rudder feathers), say nothing of any respiratory function for them. Without attempting to determine who was the first author to definitely describe them as gills, it is worth recalling that it was in them that Carus (1827) first discovered the circulation of the blood in insects. To these organs he applied the terms "Schwanzblattchen," "kiemenartigen Blättchen" and "Schwanzkiemenblättchen" (pp. 9, 14), and he figured one of them on a large scale (Taf. I, f. 4). He termed the species which he studied *Agrion puella* and although the specific identification is probably not correct, it is evident that he had before him a typical Agrionine.*

By Dufour (1852, as already quoted), and by Roster (1886, p. 242), the two functions of respiration and of locomotion were accepted without question. Roster went so far as to conclude that

> a branchial lamella is reproduced when the individual has reached such [a state] that it is not able to accomplish its development without these necessary organs and that the presence of one lamella, although compelling the insect to a forced rest, suffices to satisfy all the respiratory needs of the organism. The great variability in the dimensions of these insects can find a cause in the defective development to which a physical imperfection, such as the absence of two respiratory lamellae, gives rise (p. 245).

The observation that Agrionine larvae can live without their caudal appendages dates back at least to Roesel (1749, p. 50). Hagen (1853, p. 311), Dewitz (1890, p. 504), and Janda (1910*a*, p. 32, 1910*b*, p. 607) inferred from this survival some sort of rectal respiration.

Sharp (1895, p. 422) thought that the respiratory function of the caudal appendages "must be of an accessory nature,

*It may be mentioned here that the second species which Carus studied and figured as "eine kleine Neuropteren-Larvae," "vielleicht zu *Semblis, Sialis,* od. dergl. gehörig," was also a Zygopterous larva, as von Siebold pointed out (Archiv f. Naturgesch, VII, 1 Bd., p. 211, 1841) that it resembles the larvae of *Agrion forcipula* [= *Lestes sponsa* Hansem.] Packard's implication (1898, p. 397) that it was in the larva of *Ephemera* that Carus made his *first* observation of circulating blood is incorrect.

for the nymphs live after the removal of the processes . . . [and] the skin of these processes is harder than is usual in Insect gills." Similar views were also expressed by Heymons (1904, pp. 23, 24):

> The exchange of gas during this period [youngest larval stages] is accomplished without doubt not solely through the appendages, but in a sufficient way through the entire body-surface which at first is covered with extremely delicate chitin....During the larval period there can be no doubt that the three appendages have become primarily breathing organs from the physiological standpoint. But, earlier, the entire body-surface serves for respiration in addition to the gill-appendages and a loss of the appendages in no way leads to death of the animal.

Tillyard (1909, pp. 381-2), discussing the caudal appendages of the larva of the Australian *Diphlebia*, while admitting that "the presence of numerous branched tracheae in these gills" must mean "that *originally* they were in some way organs of respiration," points out that the loss of these gills "does not affect the respiration of the insect in any way," and doubts "whether even the wide lateral gills of *Diphlebia*, fed by two large tracheae, are of any use at present for auxiliary respiration."

Rectal Respiration. Calopteryginae.

The earliest record of observations on rectal respiration in this group appears to be that of Roesel von Rosenhof (1749, p. 43) when he says of the nymphs [of *Calopteryx*] that they draw "their air not through the mouth, but through the abdomen, and such can easily be perceived in them if they are kept in a clear glass full of water." Dufour (1852, p. 91) saw larvae of *Calopterix* "swallow through the anus the water which serves for their respiration." He described (1849, 1852, p. 87) gills in the rectum as forming three membranous folds ("raquettes") fixed by a single extremity to the inner and posterior part of the stercoral pocket in such manner as to be free and floating for two-thirds of their length. Hagen (1880*a*, p. 160) found these gills "genau wie Léon Dufour." This statement was called forth by Olga Poletaïew's denial (1880, p. 450) of the existence of rectal gills in the larva of *Calopteryx*

based on an examination of the interior envelope of the rectum in exuviae. Very recently Ris (1913, p. 95) has stated that he is disposed to consider the "older statements of Dufour and Hagen on the union in *Calopteryx* larvae of the zygopterous with a rudiment of the anisopterous organ as an error of observation."

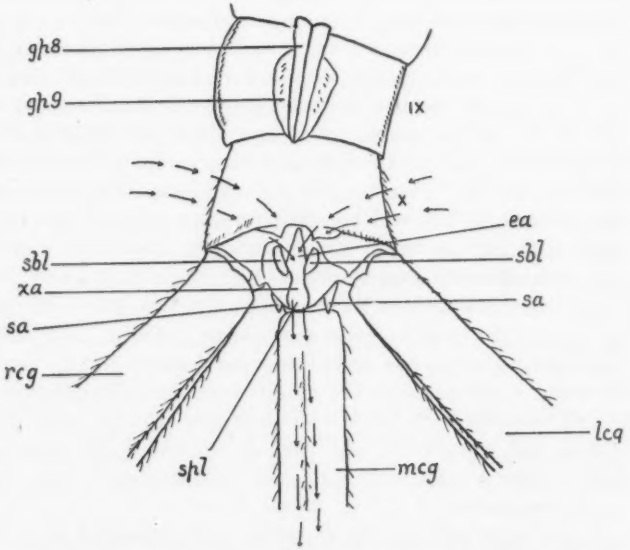
The present writer has recently made some observations on living larvae of *Calopteryx maculata* from the neighborhood of Philadelphia, as follows:

A male larva (body-length, exclusive of caudal appendages and of antennae, 17.5 mm., median caudal appendage 6 mm., lateral caudal appendage 8.5 mm.) placed in a Syracuse watch glass at 3.25 p. m. in barely enough water to cover the larva. The larva remained very quiet and was watched under a Zeiss binocular microscope with objectives a° and oculars 2. Anal expirations at the rate of 38 per minute were indicated by movements of sediment attached to the hairs on the median caudal gill.

The same larva was turned on its back at 3.30 p. m., all the other conditions remaining the same as before. The larva remained very quiet; 36 anal expirations per minute indicated as before. Powdered carmine was sprinkled on the water and floating on its surface showed very clearly the expulsions of water from the anus at a rate of 33 per minute. The carmine particles showed currents as indicated in the accompanying diagram (Text-fig. 2). The expulsions from the anus were accompanied by alternate contractions and expansions of abdominal segments 3-8, which were most marked near the lateral edges of the segments at their articulation with the next following segment. Observations on the direction of movement of carmine particles and particles of sediment *in* (not on the surface of) the water made it seem likely that the water entered the rectum through an aperture (*ea*) between the ventral margins of the right and left subanal plates and the posterior ventral margin of abdominal segment 10, and that it left the rectum by an orifice (*xa*), less easily seen in ventral view, between the supra-anal plate and the dorsal margins of the right

and left subanal plates. The chief evidence for the entrance orifice, which was not closed, was the behavior of a mass of flocculent substance, a little larger than the aperture, which, when placed over it, was rhythmically sucked inward.

A second, female, larva (body length, excl., etc., 20.5 mm., median caudal appendage 7 mm., lateral appendages 8.5 and 9 mm.) was placed on its back under the same conditions and similarly examined, carmine particles being sprinkled on the water; 40 anal expulsions per minute. In this case, however,



Text-figure 2. Ventral view of hind end of the abdomen of a female larva of *Caloptéryx maculata* Beauv. From specimen 12 mm. long (excl. antennae and caudal gills) preserved in alcohol. The arrows show the direction taken by currents of water, as indicated by carmine particles suspended in the water, under the conditions described in the text, page 438. x 24.

ea, aperture between the subanal laminae, *sbl*, *sbl*, and the hind margin of segment 10; *gp8*, gonapophyses (ovipositor) of the 8th abdominal segment; *gp9*, gonapophyses (genital valves) of the 9th abdominal segment; *lcg*, left caudal gill; *mcg*, median caudal gill; *rcg*, right caudal gill; *sa*, superior appendages of imago (cercoids); *sbl*, subanal lamina; *spl*, supra-anal lamina; *xa*, aperture between the supra-anal lamina and the subanal laminae. In this figure the apertures *ea* and *xa* are shown as continuous, as they are in the preserved specimen from which the drawing was made. In the living larvae described in the text, these two apertures were separated from each other by the approximation of the subanal laminae, but internally each communicates with the rectal cavity. IX, X, ninth and tenth abdominal segments.

both entrance and exit of the water into and from the rectum seemed to be by the aperture *ea* between the ventral margins of the subanal plates and the hind ventral margin of abdominal segment 10.

In both larvae the expulsions were much more evident than the inhalations, the latter causing very much less movement of suspended or floating particles. From time to time, for intervals of one minute or longer, both inhalations and exhalations ceased.

In a transparent living larva of *Hetaerina americana* (dimensions corresponding to those of *Calopteryx* larva quoted: 8.5, 3, 4 mm.), examined under a Zeiss compound microscope, objective A, ocular 2, the rectal tracheal supply was clearly seen to be very similar to that figured for *Thaumatoneura* (Pl. XVI) in the present paper. Rhythmic pulsations in the rectum were distinctly visible at a rate of 45-53 "sets" per minute, each "set" consisting of 3-4 successive contractions of the rectal wall, followed by a longer pause of varying duration. Currents of water corresponding to the rectal pulsations were demonstrated by the use of carmine particles as described for *Calopteryx*. Water was expelled caudad from the vicinity of the anus 45 times per minute jerkwise, each jerk apparently synchronous with the pause following each "set" of rectal contractions. The ileum moved rhythmically, cephalad from the sixth to the fifth abdominal segment while the rectum was contracting, and caudad into the sixth segment again synchronously with the pause following each "set" of rectal contractions.

In the larva of *Cora*, the condition of the material did not permit of an exact statement as to the existence of rectal tracheal gills, but it was noted that the rectal walls appeared much less richly tracheated than those of the stomach. (Calvert, 1911*a*, p. 55; *cf.* pl. ii, ff. 17, 19).

Rectal Respiration. Agrioninae.

Schmidt-Schwedt (1891, p. 104) stated that larvae of *Agrion* and of *Lestes* do not possess respiratory movements through the anus and Tümpel (1908, p. 66) asserted that all

other Agrionidae [than *Calopteryx*] lack gut-gills (Darmkiemen), but breathe only by the caudal gills. On the other hand, Dewitz (1890, p. 504) saw in transparent Agrionid nymphs under the microscope a stream of water taken into and expelled from the rectum. Tillyard (1906, p. 415) recorded the larva of *Lestes leda* as suddenly projecting "itself forward by expelling the water from its body anally," which certainly suggests two functions, locomotion and respiration, associated in the rectum as they are in Anisopterous larvae. Babak and Foustka (1907, p. 538), studying the respiratory movements of the abdomen of Odonate larvae by means of the graphic method, obtained from "a small species of the Agrionid group" results entirely similar to those from experiments on two larger Libellulid species. Their figures show the differences in the height and frequency of the respiration curves, due to the absence or presence in varying quantities of oxygen in the water in which the larva was placed. Balfour-Browne (1909, p. 279) working on larvae of *Agrion pulchellum, Ischnura elegans, Pyrrhosoma nymphula* and *Erythromma najas,* after citing Dewitz's observation quoted above, says of the stream of water passing in and out through the anus:

> from my observation it is a very weak one, nor is there any special apparatus surrounding the anus in this group to prevent ingress of foreign particles such as is found in the Anisopterids. If rectal respiration exists at all, it seems to me that it must be very slight and of but little importance, as I could not observe any increased number of contractions of the rectum in specimens of *Agrion* which had been deprived of their lamellae. In the absence of the lamellae, I think the whole of the respiration must be carried on through the skin.

It is remarkable that, as in the case of *Calopteryx,* no anatomical-histological studies have been made on the rectum of Agrionine larvae of Europe or of North America. All that exists hitherto appears to be the brief account of the rectum of the Costa Rican *Mecistogaster modestus* (Calvert, 1911*b,* pp. 452-3, pl. xvii, ff. 7, 10). The first part of the present paper gives a fuller description, of the rectal tracheal distribution at least, than any that has yet appeared.

Observation and experiment with carmine particles on living

larvae of *Argia moesta putrida* (dimensions as before: 7.5, 3 and 4 mm., and smaller), from the vicinity of Philadelphia, showed that a larva watched for two hours may give no sign of *rhythmic* rectal contractions, but that these may suddenly begin and then continue for varying periods. They consisted of sets of three rapidly successive contractions, every third contraction being of longer duration than the other two; 32 such sets per minute were noted. At other times sets of five contractions were noted. In some larvae, but not in all, the beginning of a set of rectal contractions was often synchronous with a slight shortening of the abdomen; the lengthening of the abdomen began before the contractions had ended. A rhythmic shortening and lengthening of the abdomen may perhaps furnish an indication of the existence of rectal contractions in opaque larvae. Successive removal of the three caudal gills in one larva was not followed by any immediate beginning of rectal contractions, although such were seen four hours later; the larva was not under continuous observation during all of that time, however. The observations of the *Argia* larvae were made chiefly under a Zeiss compound microscope, objective A, ocular 2.

Lateral External Abdominal Tracheal Gills

are now known for the following Calopteryginae:*

Euphaea splendens. Hagen, C. R. Soc. Ent. Belg, xxiii, p. lxvi, 1880; Zool. Anz. iii, pp. 160, 304, 1880.† Packard, Text-Book Ent. pp. 468-9, fig. 446, 1898.

Euphaea variegata. Ris, Tijdschr. Ent. lv, p. 168, pl. 6, figs. 9, 15-20, pl. 7, figs. 10-12, pl. 8, figs. 13, 14, 1912.

*The references are to descriptions of the larvae only.

†Hagen states (*l. c.* p. 160): "Die ersten derartigen Larven erhielt ich von Nietner in Ceylon und habe über sie mündlich in der Naturf.-Versamml. in Stettin 1861 berichtet." The Versammlung der deutscher Naturforscher und Aerzte in Stettin was in 1863, not 1861. The Bericht of that [38th] Versammlung for September 23, 1863, p. 137, reads "Herr Dr. Hagen über Respirations-Organe von Euphaea splendens, woran sich eine Discussion schloss, an der sich besonders Director Loew und Prof. Grube betheiligten," but nothing more. The Versammlung of 1861 was at Speyer and the Bericht thereof contains nothing by Hagen and nothing on *Euphaea*.

Anisopleura comes? Needham, Ent. News, xxii, p. 149, pl. v, figs. 1-3, 1911.

Euphaea dispar? Hagen, C. R. Soc. Ent. Belg., xxiii, p. lxvi, 1880.

Bayadera indica. Needham, Ent. News, xxii, p. 150, pl. v, figs. 4-7.

Anisopleura comes? Hagen, C. R. Soc. Ent. Belg., xxii, p. lxvi, 1880.

Cora chirripa. Calvert, Ent. News, xxii, p. 49, pls., ii, iii, 1911.

It is not stated whether these lateral gills are kept in movement during life or not.

Stigmata (Spiracles).

Dewitz (1890, pp. 504, 526), on immersing Agrionid nymphs in diluted alcohol, or on raising or lowering the temperature of the water in which they were contained, saw air escape from a thoracic stigma of one side of the body. As the older nymphs crawled up to the surface of water, which had been boiled, and exposed their dorsal thoracic surface, he inferred that they inspired atmospheric air.

By subjecting the early stages of Odonata to the action of oleo-ether and to partial vacua, Portier (1911, pp. 216-7) concluded that in *Calopteryx,* as in *Aeschna* and *Libellula,* the tracheal system is not closed to air, although not permeable to water, fats or their solvents. In the younger *larvae,* one or the other of a pair of ventral spiracles at the junction of thorax and abdomen allows passage to air, while in the older *nymphs* these ventral stigmata are lacking, but one or other of a pair of anterior dorsal thoracic [mesothoracic] spiracles transmits air from within or from without.

Bervoets (1913, pp. 25-26) also employed the vacuum method. In larvae of *Agrion* 3 mm.* long he was unable to perceive any discharge of gas until he cut the caudal gills; in larvae 5 mm.* in length and longer, bubbles of gas issued from the dorsal stigmata between the pro- and meso-thorax, always more abundantly from one side than from the other.†

*These dimensions were exclusive of the caudal appendages.

†Bervoets has used (pp. 27, 29) the term *Isoptera* for the Agrionidae, evidently in contrast with Anisoptera. Isoptera is, of course, preoccupied as an ordinal name for the Termites.

These experimental researches on the permeability of the spiracles to air may afford an explanation of the results obtained by East (1900, p. 212), who kept nymphs of *Erythromma najas* and of *Agrion puella* alive, out of water, for one month and for thirty-three days, respectively. They had no food during this period and yet the nymph of *E. najas* moulted in the midst of it.

Conclusion.

From the various data which have been brought together here, it seems reasonable to suppose, at least until much more exact experiments show the limitations of each mode of respiration for different stages and for different species of Zygopterous larvae, that the general body-surface, the caudal processes, the rectal epithelium, certain spiracles and, in a few species, lateral external abdominal tracheal gills, *all* contribute to satisfying the needs of the organism for oxygen. A classification which regards the larvae or nymphs of any one group as exclusively or predominantly Caudobranchiate is not justified by our present knowledge. The fact that the larvae of *Thaumatoneura* spend much of their lives moistened by, but not submerged in, water, tempts one to refer the relatively small surface of their caudal appendages ("gills") to this mode of life. The similarity of their rectal tracheation to that of the larva of *Hetaerina americana* and the existence of rectal respiration in the latter lead one to expect that a similar condition will be demonstrated by observations on living *Thaumatoneura* larvae.

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Destructive Grasshoppers in Costa Rica (Orth.).

Señor Anastasio Alfaro, Director of the Museo Nacional of Costa Rica, has described the invasion of Costa Rica by locusts in the present year in *Revista de Education,* San José, Oct., 1915. The species concerned, identified by Mr. J. A. G. Rehn, are *Schistocerca paranensis* and *S. zapoteca,* the former predominating. The invaders entered from the north in two columns, one along the Pacific lowlands, the other along those of the Atlantic. A detachment from the latter column crossed the mountains by the Rio San Carlos and Zarcero into the province of Alajuela. Previous locust years in Costa Rica were 1659, 1731, 1774, 1800, 1852 and 1876.

Some North American Diptera from the Southwest—Paper III.*

A Revision of the Species of the Genus Mythicomyia.

By E. T. CRESSON, JR., Academy of Natural Sciences, Philadelphia.

The material upon which this paper is based was collected in western Texas, Arizona and New Mexico by J. A. G. Rehn and H. L. Viereck in the late spring of 1902. The collection is unusually rich in several little known genera, of which this anomalous one is especially favored. The study of the material resulted in recognizing eight distinct species, including four considered new. Of the four previously described species three of these are recognized in the material at hand. By courtesy of the United States National Museum, I have been enabled to examine the material there including Coquillett's types. I have, therefore, seen the types of all the known species. One of the new species and some of the records were obtained from the United States National Museum collection and are so credited.

Of the students who have given this genus any study, I think Coquillett was correct in considering it to belong to the Empididae, and he ably states his reasons for this in ENTOMOLOGICAL NEWS, iv, 209. Williston, in his Manual[1], notes that it should probably accompany *Hilarimorpha* in the Leptidae. In the third edition of his Manual he does not include it in any of the tables of genera, but mentions the genus in a note[2] and figures the wing, antenna and entire insect under the Bombyliidae and Empididae. Melander includes it in his Monograph of the Empididae[3] under the subfamily Mythicomyinae accompanied by *Hilarimorpha,* but does not otherwise commit himself as to the probable relationship. Aldrich and Kertesz in their catalogues place both genera in the Leptidae.

*Paper I. Tr. Am. Ent. Soc. xxxii, 279-288, 1906; Paper II. Tr. Am. Ent. Soc. xxxiii, 99-108, 1907.

1. Ed. 2, p.73.
2. P. 218.
3. Tr. Am. Ent. Soc. xxviii, p. 336.

I do not know the genus *Hilarimorpha* and therefore cannot say whether or not it is related to *Mythicomyia,* but I think it probably is. As to the genus *Mythicomyia,* I agree with Coquillett in placing it in the Empididae, and with Melander in making it typical of a distinct subfamily. Its affinity to the Bombyliid genera allied to *Geron* and *Rhabdopsephalus* may be considered, but I cannot associate it with the Leptidae.

I find the anal cell to be either closed or distinctly open, so this character is of no family importance. The form of the antennae and the venation, except as to the anal cell, are constant in the material examined. Taking these, as well as the sum of the other characters, into consideration the genus surely favors the Empididae, and may be distinguished by the short second vein ending in the first.

On account of the dissimilarity between the sexes, it is difficult to associate them in many cases, and it is possible that some synonomy is created. This is, of course, unavoidable with our present limited knowledge of the species. However, synonomy is much preferable to misidentification.

MYTHICOMYIA.

1893. Coquillett, Ent. News, iv, 209.
1896. Coquillett, Proc. U. S. Nat. Mus., xviii, 409.
1896. Williston, Man. N. A. Dipt. ed. 2, 73 (note).
1902. Melander, Tr. Am. Ent. Soc., xxviii, 337.
1905. Aldrich, Catalogue, 218.
1908. Williston, Man. N. A. Dipt. ed. 3, 218 (note).
1908. Kertesz, Cat. Dipt. iii, 333.

Destitute of macrochaetae. Head globular, attached by a distinct neck. Antennae porrect; first joint very short, indiscernible; second as long as broad; third at least as broad as second, lanceolate, elongate, not annulated, much longer than first and second together; style terminal, robust, conical or cylindrical, pointed, much narrower than third. Eyes of male contiguous, with enlarged facets above. The ocellar tubercle prominent with the ocelli widely separated and equidistant. Proboscis porrect, rigid, without labella. Palpi minute.

Thorax hemispherical, convex above, higher than long, hunch-backed. Abdomen ovate, pointed, with seven segments

in both sexes. Hypopygium distinct, complicated. Legs moderately slender; tibiae at most with short spurs; hind tibiae and tarsi of male sometimes with characteristic appendages or processes; pulvilli well developed; empodium hairlike. Wings with second vein short, ending in and near apex of first; vein seven weak, sometimes evanescent; first section of fourth vein obliterated or faint; marginal cell closed; only one submarginal cell; four open posterior cells; anal cell narrowly open, or closed near margin.

Genotype.—Mythicomyia rileyi Coquillett.

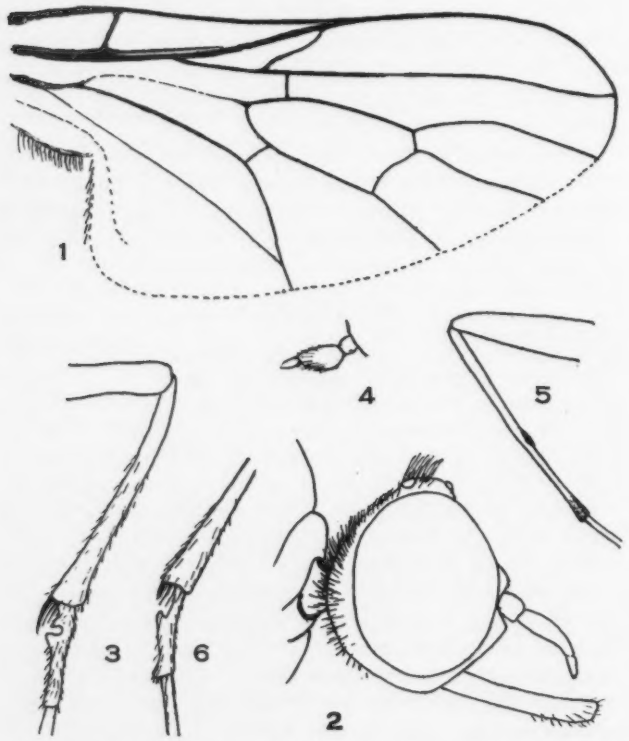


Fig. 1. *Mythicomyia flavipes:* wing. 2. Ibid.: profile of head of male. 3. *M. armata:* hind tibia and base of tarsi. 4. *M. scutellata:* antenna. 5. *M. armipes:* fore tibia. 6. Ibid.: basal joint of hind tarsi.

TABLE OF SPECIES.

Males.

1. Second antennal joint and legs yellow ..... *flavipes*
   Antennae black 2
2. Basal joint of hind tarsi notched near base beneath..... 3
   Not so ..... *atra*
3. Hind tibiae stout with an apical spur extending to or beyond the notch 4
   Hind tibiae without any spur..... 5
4. Fore tibiae very long and slender with black swelling near middle; hind tibial spur short; basal joint of hind tarsi shorter than following ..... *armipes*
   Fore tibiae normal; hind tibial spur very long; basal joint of hind tarsi longer than following..... *armata*
5. Tibiae and femora black ..... *tibialis*
   Tibiae and only apical half of femora yellow ..... *rileyi*

Females.

1. Second antennal joint and legs yellow ..... *flavipes*
   Antennae black 2
2. Shining species with yellow scutellum ..... *scutellata*
   Opake pruinose species 3
3. Legs entirely yellow ..... *rileyi*
   Femora and tibiae marked with black ..... *pictipes*

Mythicomyia scutellata, Fig. 4.

1902. Coquillett, Proc. U. S. Nat. Mus. xxv, 102.

♀. Black, polished, sparsely pilose. Frons at antennae, face, cheeks, oral margin, humeri, notopleural stripe and post alar spot, scutellum, pleural stripe sometimes faint or wanting, halteres, apices of abdominal segments broad laterally, venter, knees, apices of tibiae, tarsi, or sometimes entire legs except apices of tarsi, yellow.

Third antennal joint ovate, broader than second, somewhat longer than broad (fig. 4); style cylindrical hardly half as long as third. Proboscis short not longer than head. Anal cell open. Length 1.5 mm.

♂. Unknown.

Type.— ♀, Williams, Arizona, June 6, 1902 (H. S. Barber), [U. S. N. M. No. 6195].

Paratypes.—3 ♀; topotypical.

Before me are four specimens from Alamogordo, New Mexico, and one from Highrolls, New Mexico, collected in April and May, which I refer here without doubt. The color of the legs varies considerably and it is questionable whether such can be used in the separation of the species. In three of these

individuals the mesonotum is black, the scutellum is much smaller than usual, nearly semi-circular, not broader than long. The other specimen (Alamogordo, N. Mex., May 1) is almost entirely yellow, with antennae, vertex, three broad subcoalescing mesonotal stripes, the middle one abbreviated posteriorly and the others anteriorly, and a median series of small spots on the apices of abdominal segments, black. This may prove to belong to a distinct species, but it is similar in other respects to the remainder of the series. A peculiarity in one of the former series (Alamogordo, N. Mex., May 1) is the absence of the posterior cross vein in one of the wings, the second posterior vein curving from the sixth vein so as to keep its original position in entering the margin of the wing. This may possibly be regarded as a point towards establishing an affinity with the Empididae.

In the U. S. National Museum are 2 females with the same data as those of the typical series, but collected on flowers of *Purshia tridentata;* also a female from Bright Angel, Colorado Canyon, Arizona, 2300 ft. alt., May 10, 1903 (H. S. Barber). The former two may belong to the original typical series.

Mythicomyia flavipes new species. Figs. 1 and 2.

♂. Black, densely gray pruinose and moderately long white pilose. Frons, face, cheeks, oral margin, second antennal joint, humeri, postalar spot, margin of scutellum, halteres, several spots beneath wings, narrow apices and broad lateral apical angles of abdominal segments, venter, hypopygium, apices of fore coxae, all legs except apices of tarsi and basal spot above on femora, and veins of wings, yellow.

Line of demarcation of upper and lower facets of eyes distinct. Proboscis protruding beyond length of head. Third antennal joint three times as long as second, hardly as broad, attenuated at both extremities; style one-third as long as third, conical. Anal cell closed. Tarsi not notched. Length, 2 to 3 mm.

♀. Similar but pile shorter. Yellow and densely pruinose with eyes, ocellar tubercle, third antennal joint and style, mesonotum except broad lateral margins and a divided quadrate spot near base of scutellum, pleural spots, narrow bases of abdominal segments, black. Proboscis and tarsi brown.

Type.—♂, El Paso, Texas, April 4, 1902. [A. N. S. P. No. 6097].

Paratypes.—9 ♂, 18 ♀, topotypical.

Homotypes.—2 ♀, Alamogordo, New Mexico.

The yellow legs and the conspicuous second antennal joint are the salient characters. There is some variation shown in the above series in the color pattern. In the males the lateral mesonotal margins may be entirely yellow and the femora quite dark basally, especially the fore pair. In the females the abdominal segments may be broadly black, especially the second, and the yellow mesonotal quadrate spot sometimes wanting.

Mythicomyia pictipes.

1902. Coquillett, Proc. U. S. Nat. Mus. xxv, 102.

♀. Black, opake, gray pruinose, sparsely white pilose. Frons at antennae, face, cheeks, oral margin, humeri, broad lateral mesonotal margins, scutellum except discal spot and lateral margins, pleural spots, halteres, apices of abdominal segments dilated laterally then becoming narrow again just over on to the ventral lobes, then dilating to the ventral margins, venter and legs, except femora and tibiae above and tarsi apically, yellow.

Third antennal joint narrow, elongate, about four times as long as broad; style half as long as third joint. Abdominal spiracles prominent, shining. Anal cell open. Length, 2.5 mm.

♂. Unknown.

Type.—♀, Williams, Arizona, May 29, 1902 (H. S. Barber), [U. S. N. M. No. 6196].

Paratype.—1 ♀, topotypical.

I have seen a ♀ Catal Springs, Arizona, Apr. 14 (Hubbard & Schwarz), [U. S. N. M. Coll.]; also a ♀, Alamogordo, New Mexico, Apr. 20, 1902 (Rehn & Viereck), [A. N. S. P. Coll.].

Mythicomyia tibialis.

1896. Coquillett, Proc. U. S. Nat. Mus. xviii, 409.

1902. Melander, Tr. Am. Ent. Soc. xxviii, 338.

♂. Black, gray pruinose, especially beneath; white pilose, especially long on occiput and abdomen. Frons, face, cheeks, humeri, notopleural stripe, post-alar spot, halteres, hypopygium largely, knees and bases of hind tarsi, yellow or whitish.

Third antennal joint three times as long as broad, tapering to the style; latter one-third length of third joint. Mesonotum opake black with a broad medial shining submetallic stripe. Abdomen opake black, elongate, narrow. Hind tarsi with rounded notch as in *armata* but without tibial spur. Anal cell open. Length, 3.5 mm.

♀. Unknown.

Type.— ♂, Los Angeles County, California, July (D. W. Coquillett), [U. S. N. M. No. 3190].

Mythicomyia rileyi.

1893. Coquillett, Ent. News, iv, 209.

1902. Melander, Tr. Am. Ent. Soc. xxviii, 338.

♂. Black, rather densely gray pruinose. Occiput above and ocellar tubercle behind white. Frons, face, cheeks, oral margin, humeri, postalar and notopleural line, pleural spots, halteres, narrow apices of abdominal segments, apices of femora, bases of tibiae and tarsi, whitish; apices of tibiae brown.

Third antennal joint lanceolate, scarcely broader than second, three times as long as broad; style cylindrical, half as long as third. (Antennae of type missing.) Hind tarsi notched at base. Anal cell open. Hypopygium shining, exserted, larger than preceding segment. Length, 1.5 to 2.0 mm.

♀. Similar, but lower frons, broad notopleural stripe, scutellum except discal spot, all legs, including coxae, yellow. Proboscis twice as long as head.

Type.— ♂, Kern County, California, May (D. W. Coquillett), [U. S. N. M.].

This species seems very closely allied to *tibialis,* but is much smaller, the legs are lighter, the hypopygium is black and the abdomen not velvety black.

I have seen another male in the U. S. National Museum from Mesilla, New Mexico, Apr. 22 (T. D. A. Cockerell; on *Erigeron* flowers). There are before me 2♂, 5♀, from Alamogordo, New Mexico, Apr. 23, 1902, which seem to be the same, and from which the above description of the female was drawn. The males, however, have the hypopygium inconspicuous, and one of them has no white on the ocellar tubercle.

Mythicomyia armipes new species. Figs. 5 and 6.

♂. Black; frons except ocellar tubercle, face, cheeks, humeri, postalar calli, pleural marks, halteres, apices of abdominal segments, apical half of fore femora, apices of middle and hind femora, fore tibiae except a medial spot and apices, bases of middle tarsi and wing veins, yellow. Wings hyaline.

Opake; occiput, lateral margins of mesonotum, pleurae, lateral margins and apical segments of abdomen and femora grayish.

Third antennal joint three times as long as broad; style half as long as third. Abdomen elongate; hypopygium inconspicuous. Legs long,

especially fore tibiae which are much longer than their femora and have a shining black swelling beneath, slightly beyond the middle (Fig. 5). Middle tibiae sinuate. Hind tibiae dilated apically with a short stout spur at flexor apex accompanied by a comb of few long hairs; the spur not over-reaching the tarsal notch. Basal joint hind tarsi much shorter than following joint with a large notch at its base (Fig. 6). Anal cell open; sixth vein weak. Length, 1.7 mm.

♀. Unknown.

Type.— ♂, Las Cruces, New Mexico, Sept. 25, 1895 (T. D. A. Cockerell), [U. S. N. M. No. 19925].

This species I found associated with *M. tibialis* Coq. in the U. S. National Museum collection. It is very similar to that species, but the characters on the legs are at once distinctive. The tibial spur simulates that of *armata,* but is not as long and the tarsal notch is more extensive. The second joint of the hind tarsi is noticeably much longer than the preceding one and the fore tibiae also unusually long and slender with the characteristic black swelling at its middle. I am not aware whether these characters exist in *tibialis* Coq. or not.

Mythicomyia armata new species. Fig. 3.

♂. Black, thinly gray pruinose. Frons, face, cheeks, oral margin, humeri notopleural line and post-alar and pleural spots, halteres, apices of abdominal segments, venter, apical half of fore and of middle femora, hind femora except basal spot, all tibiae and bases of tarsi, yellow.

Third antennal joint ovate twice as long as second; style cylindrical, more than half as long as third. Hind tibiae with a long apical spur, over-reaching the tarsal notch (Fig. 3). Anal cell open. Length, 1.7 to 2.0 mm.

♀. Unknown.

Type.— ♂, Highrolls, New Mexico, May 30, [A. N. S. P. No. 6098].

A specimen before me from the Yosemite Valley, California, lacks the antennae, but it is evidently this species.

The spur of the hind tibia, which is no doubt functional in connection with the tarsal notch, is very characteristic of this species. It is not present in any other species known to me, at least as strongly developed as here. Usually such spurs are minute and scarcely noticeable.

Mythicomyia atra new species.

♂. Black, shining, but faintly pruinose in certain aspects, sparsely white pilose. Frontal triangle, face, cheeks, humeri, narrow notopleural line, faint post-alar spot, narrow posterior margin of mesopleural, halteres and spot below, narrow apices of abdominal segments and knees, yellow.

Slender species. Proboscis shorter than head. Third antennal joint two and one-half times as long as second, hardly as broad, attenuated apically; style one-third as long as third, cylindrical, pointed. Face very short and cheeks very narrow. Legs slender with hind tibiae and tarsi normal. Hypopygium inconspicuous. Anal cell broadly open and anal vein evanescent. Length, 1.7 to 2.2 mm.

♀. Unknown.

Type.—♂, Highrolls, New Mexico, May 31, 1902 [A. N. S. P. No. 6099].

Homotypes.—2 ♂, Alamogordo, New Mexico, April.

Allied to *tibialis*, but the hind tarsi are not notched, and the prunosity very faint.

Twenty-eighth Annual Meeting of the American Association of Economic Entomologists.

The 28th annual meeting of the American Association of Economic Entomologists will be held at Columbus, Ohio, December 27 to 30, 1915. The sessions will be called to order in the Botany and Zoology Hall at the Ohio State University.

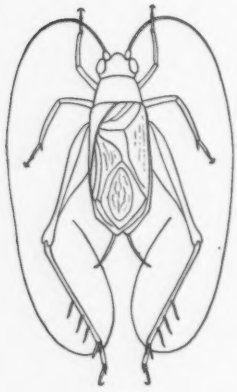
The opening session will be held at 1:30 P. M. Monday, December 27, when the annual reports and address of the President will be delivered. On Monday evening the section on Apiary Inspection will hold a meeting at 8:00 P. M.

The Association will continue its meetings on Tuesday at 10:00 A. M. and 1:30 P. M.; on Wednesday at 1:30 P. M., and the final session will be held Thursday at 10:00 A. M. The section on Horticultural Inspection will hold its meeting on Tuesday at 8:00 P. M. and Wednesday at 10:00 A. M.

Hotel headquarters of the Association will be at the Southern Hotel on South High St.

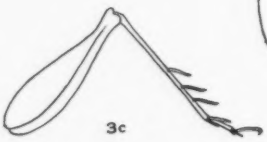
A smoker will be tendered by the Ohio entomologists to all visiting entomologists on Wednesday evening after the public address before the Entomological Society of America.

A large and varied program of papers will be presented and many members have already signified their intention to attend the meeting.—A. F. Burgess, *Secretary*.

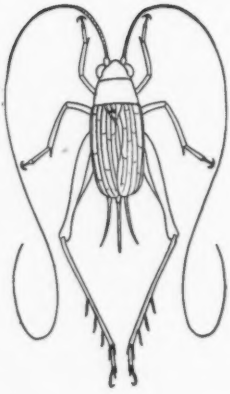


3A

3D



3C



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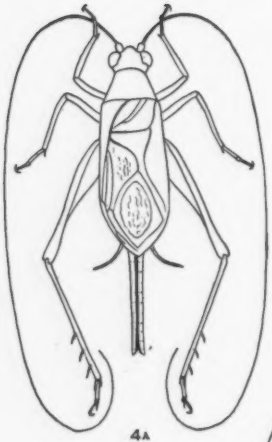
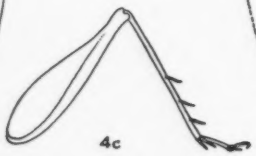


4A

4D



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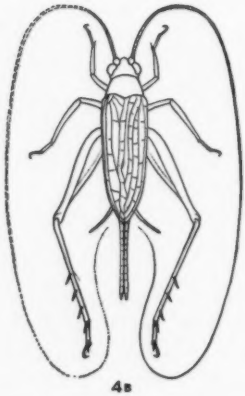

4B

MIAMI, FLORIDA, ORTHOPTERA—HEBARD.

Dermaptera and Orthoptera Found in the Vicinity of Miami, Florida, in March, 1915—(Part II).

By Morgan Hebard, Philadelphia, Pa.

(Plate XX.)

Tettigoniidae.

Arethaea phalangium (Scudder). Southside, Miami, III, 16, 1915, (H.; undergrowth of pine woods), 1 very small juv.

This tiny specimen (length 2.8 mm.), with its very long limbs and antennae, looked like a bit of greenish white fluff.

Stilpnochlora marginella (Serville). Brickell's Hammock, Miami, III, 5, 1915, (H.; beaten from heavy shrubbery in dense jungle), 1 juv. ♀.

The length of this immature individual is 14.2 mm.

Scudderia texensis Saussure and Pictet. Southside, Miami, III, 6, and 16, 1915, (H.), 2 ♂, 2 juv. ♂, 3 juv. ♀, 1 very small juv.

This species is widely distributed and locally not uncommon in the undergrowth of the pine woods. Four instars are represented by the immature material before us.

Phrixa maya Saussure and Pictet. Brickell's Hammock, Miami, III, 5, 1915, (H.; beaten from heavy shrubbery in dense jungle), 1 very small juv.

Careful and long continued work on two days, including many hours constant beating, secured this single small specimen (length 8 mm.) at a point but a short distance from the spot at which Mr. Wm. T. Davis captured an adult male on September 22, 1913, the first record for the genus and species from the United States.[12] In spite of the immature condition of the present specimen, the distinctive generic features are readily recognizable and the adult from the same spot fixes satisfactorily the specific identity as well.

The beating work necessary to secure this specimen was particularly trying, as during the entire time the only other specimens of Orthoptera secured were the immature example of *Stilpnochlora marginella* recorded above and a very small

[12] Recorded by Wm. T. Davis, Jour. N. Y. Ent. Soc., XXII, p. 197. (1914).

immature specimen of a Tettigoniid genus, which we believe has not yet been recorded from this region but which we can not determine from the material at hand.

Amblycorypha floridana floridana Rehn and Hebard. Virginia Key, III, 11, 1915, (H.; beaten from luxuriant vegetation), 1 very small juv. Cape Florida, Key Biscayne, III, 12, 1915, (H.; luxuriant vegetation in clearing), 2 juv. ♀.

The Cape Florida specimens have been bred; the larger when taken, reached maturity March 22; the other, which was very small when taken, became adult May 13.

Amblycorypha uhleri Stål. Southside, Miami, III, 6, 1915, (H.; undergrowth of pine woods), 1 juv. ♂.

Microcentrum rhombifolium (Saussure). Miami, III, 4, 1915, (H.; on shrubbery, stridulating at night), 2 ♂.

This insect was not uncommon about the town in the trees and shrubbery, as could be determined on warm evenings by the frequently heard stridulations. On nights when the temperature fell at dusk below 65° (normally an infrequent condition at Miami, but the usual occurrence at the time the collections here studied were made) all Orthopteran stridulations ceased.

Microcentrum rostratum Rehn and Hebard. Southside, Miami, III, 6, 1915, (H.; undergrowth in pine woods near hammock where occasional low green bushes were to be found), 1 ♀, ♂.

Belocephalus sabalis Davis. Miami, VII, 11 and VIII, 19, 1904, (W. S. Dickinson), 2 juv. ♀. [Hebard Cln.].[13] Southside, Miami, III, 6, 1915, (H.; undergrowth in pine woods), 2 very small juv. ♀

One of the specimens from Southside has been kept alive and is flourishing on a diet principally composed of lettuce. Its actions show how absolutely nocturnal the species is; this

[13] Two females recorded from Miami and Chokoloskee, as *subapterus* (the only species of the genus at that time described) by Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1905, p. 44. (1905.) can at the present moment not be found. There is little doubt that these records are erroneous, as that species is not known and is probably not present in extreme southern Florida. The specimens probably represent this, the most generally distributed species in this region. The female from Miami was from the same collection as the immature females here recorded.

specimen resting rigid in some concealed position during the day, with cephalic limbs and antennae directed straight forward and median and caudal limbs straight backward, but at night moving actively about and extremely alert and rapid in its movements.

We have before us two large immature females of this species taken by E. A. Schwarz at Cocoanut Grove, Florida, in May, 1887, and two adult brown females taken by the same collector during that year in Dade County. The female of this species closely resembles the male in all features common to both sexes, the ovipositor is decidedly shorter than in *B. subapterus* and is weakly upcurved. The measurements of these specimens are: length of body 34.2 and 39.5, of vertex from tooth to tip 3.1 and 3.3, of pronotum 9. and 9.9, of exposed portion of tegmen 1.8 and 2.2, of caudal femur—and 21.8, of ovipositor 15.2 and 16.2, width of tegmen 2.3 and 2.6 mm.

Orchelimum concinnum Scudder. South of Brickell's Hammock, Miami, III, 3, 1915, (H.; very few juv. in salt marsh), 1 very small juv. ♀.

The very small immature examples seen were probably the very first of this species to appear. In July, the marshes of this region swarm with the young of this species.

Conocephalus gracillimus (Morse). Southside, Miami, III, 6 and 16, 1915, (H.; locally not scarce in heavier patches of low undergrowth and grasses in the pine woods), 9 ♂, 1 ♀, 2 juv. ♀.

Of the above series the adult female alone has the face, lower portions of the lateral lobes of the pronotum, pleura, ventral portion of abdomen, basal half of ovipositor and the tibiae brilliant green (Scheele's green), the other specimens have these portions isabella color varying to yellowish olive.

Odontoxiphidium apterum Morse. Miami Beach, III, 12, 1915, (H.; one specimen in beach vegetation back of strand), 1 very small juv. Southside, Miami, III, 6, 1915, (H.; beaten from undergrowth of pine woods), 1 very small juv.

Atlanticus glaber Rehn and Hebard. Southside, Miami, (H.; rare but widely distributed through undergrowth of pine woods), III, 6, 1915, 4 juv. ♂, III, 16, 1915, 1 ♂, 3 juv. ♂.

These immature individuals were kept alive and all but one successfully reached maturity, the dates being April 12, 13,

17, 18, 20, 22 and 24. Two specimens were, when taken, in the next to the last instar preceding maturity; these were the last two to become mature. The species was very scarce but widely distributed, all of the work undertaken on two days in the pine woods being with the main purpose of securing this insect.

GRYLLIDAE.

Scapteriscus abbreviatus Scudder. Musa Isle, III, 4 and 10, 1915, (H.), 3 ♂, 5 ♀, 16 juv. in four last instars.

The soft fat abdomen of this species is in life whitish and distinctly paler than the hard portions of the insect.

The present series was dug out of sandy soil in a grape fruit grove during the afternoon. Individuals were found to burrow but a few inches beneath the surface of the ground, coming to the surface to feed beneath decaying grape fruit. Scarcely any were seen in the burrows frequently disclosed upon overturning grape fruit and these instantly disappeared in the burrows. The series was taken by rapidly overturning the soil in the vicinity of such debris and also in areas of scant weeds and about the roots of grape fruit shoots. In many places nothing was found, while in a few spots a number of individuals would be exposed, though everywhere the ground was tunnelled by these insects.

Everywhere about Miami in sandy soil the insect, which is locally called "cricket-mole", is said to do decided damage, particularly to farm truck. One of the older inhabitants informed the author that he remembered when these insects were not found in this region and that they had been accidentally introduced in manure from Key West.

Ellipes minuta (Scudder). South of Brickell's Hammock, III, 3, 1915, (H.; scarce in salt marsh near border), 1 ♂, 1 ♀.

These individuals have the wings concealed by the tegmina.

Cryptoptilum antillarum (Redtenbacher). North edge of Brickell's Hammock, Miami, III, 4, 1915, (H.; under bark of live oak while searching for *Obligacanthopus prograptus*), 1 ♀, 1 juv. ♀ in last instar. Cape Florida, Key Biscayne, III, 12, 1915, (H.; beaten from luxuriant vegetation in clearing), 1 juv. ♂ in early instar.

Cryptoptilum trigonipalpum Rehn and Hebard. Brickell's Hammock, Miami, III, 15, 1915, (H.), 1 ♂, 1 ♀, 2 juv. ♂ in intermediate instar, 2 juv. ♀ in two intermediate instars.

This entire series was found on a chilly morning under the bark of *Exothea paniculata* at about ten feet from the ground, about which tree trunk were touching leaves from an adjacent shrub. Under the loose bark of the same tree *Oligacanthopus prograptus* and *Orocharis gryllodes* were found.

Cycloptilum zebra Rehn and Hebard. North edge of Brickell's Hammock, Miami, III, 4, 1915, (H.), 2 juv. ♂, 1 juv. ♀, in two early instars.

These specimens were found in low vegetation about the foot of live oaks in an open grove, while searching on these trees for *Oligacanthopus prograptus.*

Oligacanthopus prograptus Rehn and Hebard. (Pl. XVIII, figs. 2A, 2B.) North edge of Brickell's Hammock, Miami, III, 4, 1915, (H.), 1 juv. ♂, 1 juv. ♀. Brickell's Hammock, Miami, III, 4, 5 and 15, 1915, (H.), 7 ♂, 5 ♀, 20 juv. ♂, 18 juv. ♀. South edge of Brickell's Hammock, Miami, III, 3, 1915, (H.), 1 ♂, 1 ♀, 1 juv. ♂, 2 juv. ♀.

The present series of fifty-seven specimens was taken by peeling off loose bark on two typical trees of the hammock jungle, *Exothea paniculata* and *Coccolobis laurifolia,* and on live oaks, *Quercus virginiana,* a few of which latter trees are found scattered through the pine woods on the south border of the hammock and groves of which are distributed along the north edge of the hammock. Often several trees would be thoroughly examined without success, but usually two or three specimens would be found and rarely six or seven, on the same tree. When revealed, the tiny insects either fell with the bark or remained usually motionless when they could easily be made to jump into the beating net, which was held below the spot under investigation to catch the bark and any specimens which might fall with it. Without such use of a net the species would prove very difficult to capture. The species is apparently wholly nocturnal and individuals probably seldom leave the tree trunks. This latter is indicated by the peculiar silvery general coloration of the insects, mottled and speckled with dark brown, which blends perfectly with the bark of the trees upon which they are found, but which would cause them

to be conspicuous under many other environmental conditions. The present species was hitherto known only from the unique female type, taken from under a sign on a live oak on the north border of Brickell's Hammock by the author on February 16, 1904.[14]

Allotype: ♂ ; Brickell's Hammock, Miami, Florida, March 5, 1915. (Hebard; under bark of *Exothea paniculata.*) [Hebard Collection.]

Description of Allotype. Very similar in size and form to the type. Pronotum with dorsum transversely very gently arcuate, curving sharply laterad, cephalic and caudal width equal, this dimension slightly less than length, lateral outlines of disk weakly convex, cephalic margin weakly concave, caudal margin very weakly convex and nearly straight. As in the female sex, no tegmina or wings are developed. Every portion of the insect is heavily clothed with scales excepting the eyes, cephalic portion of the face, mouth-parts and antennae. Titillatores represented by minute, elongate projections which are cylindrical, straight, tapering distad gently to apex which reaches above depressed distal portion of roughly shield-shaped supra-anal plate. Sub-genital plate transverse, with distal margin broadly arcuate. Color pattern distinctive as in the type, with which the allotype agrees in all other characters given in the original description.

Coloration. As in the type, the series before us shows the four parallel vertical dark bars on the vertical cephalic face of the interantennal protuberance, some specimens have these bars unusually heavy but in no case do they fuse. The absence of some of the scales in the type made the normal color pattern, produced by the light and dark scales, indistinguishable. This is found to be constant in the series before us and is illustrated by the accompanying figure of the allotype. We also figure the cephalic aspect of the head of this specimen, as this figure of the type accompanying the original description is very badly out of proportion. These features of coloration are found the same in the five instars of the immature condition before us.

Measurements (in millimeters)

	Length of body	Length of pronotum	Caudal width of pronotum	Length of caudal femur	Length of ovipositor
Allotype ♂, ...	6.4	1.7	1.6	3.8	....
Topotypic ♂, (7)...	6.2-6.7	1.5-1.7	1.4-1.6	3.7-4.2	....
TYPE, ♀	6[15]	1.5	1.4	3.7	2.5
Topotypic ♀, (6)...	6.-6.7	1.6-1.7	1.6-1.7	4.1-4.3	2.7-3

[14] Fully described by Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 219. (1912.)

[15] With the original description this measurement is given as 5.8 mm. as the authors supposed that the head was carried with dorsal surface declivent distad. We find that the head is carried horizontally, with occiput partially concealed by the pronotum but with distal portion of occiput, interantennal space and dorsum of vertex, in the same plane with the dorsum of the pronotum.

In the immature series, the last instar preceding maturity is represented by 7 ♂, 8 ♀ (length of body averaging about 5.6, of ovipositor 1.7 mm.); the previous instar by 5 ♂, 7 ♀ (length of body averaging about 4.7, of ovipositor .7 mm.); the second from the last instar by 8 ♂, 2 ♀ (length of body averaging about 4.3 mm., ovipositor valves joined but not extruded); the third from the last instar by 2 ♂, 2 ♀ (length of body averaging about 4 mm., ovispositor valves not yet joined), and fourth from the last instar by 2 ♀, (length of body averaging about 3.3 mm., ovipositor valves not yet joined).

Hygronemobius alleni (Morse). Mangrove swamp, edge of Brickell's Hammock, Miami, III, 15 and 16, 1915, (H.; bare muck and tidal litter in red mangrove swamp), 1 ♂, 7 ♀, 4 juv. ♂, 6 juv. ♀.

This series, which constitutes the first record for the genus from the United States, has recently been recorded and fully commented upon by the present author.[16]

The immature individuals represent three instars; the instar preceding maturity by 2 ♀ (length of body averaging approximately 4.8 mm.), the previous instar by 2 ♂, 2 ♀ (length of body averaging approximately 3.7 mm., male tegmina large and rounded, wings minute) and the second from the last instar by 2 ♂, 2 ♀ (length of body averaging approximately 3.4 mm., male tegmina and wings very small and equally projecting).

Nemobius ambitiosus Scudder. North edge of Brickell's Hammock, Miami, III, 4, 1915, (H.; moderately numerous in debris under low vegetation along borders of live oak groves), 1 ♂, 1 juv. ♂.

Nemobius cubensis cubensis Saussure. Cape Florida, Key Biscayne, III, 12, 1915, (H.; bare muck in red mangrove swamp), 2 ♂, 1 ♀.

These specimens are brachypterous and unusually small for the species. Though very dark in general coloration with limbs much mottled, the female is further unusual in having the exposed portion of the dorsal surface of the abdomen bearing four rows of distinct pale yellowish spots, which marking is the normal condition in the otherwise very distinct *N. carolinus* and its races.

Nemobius carolinus carolinus Scudder. Miami Beach, III, 12, 1915, (H.; only Orthoptera seen after long continued search in red mangrove swamp, on bare muck under roots), 1 ♂,

[16] Ent. News, XXVI, p. 195. (1915.)

1 ♀. Virginia Key, III, 11 and 15, 1915, (H.; locally common in dense red mangrove swamp on sodden leaves under a labyrinth of roots), 10 ♂, 7 ♀, 7 juv. ♂, 8 juv. ♀. Cape Florida, Key Biscayne, III, 12, 1915, (H.; only specimens seen on bare muck of red mangrove swamp), 1 ♀, 1 juv. ♀.

This series is exceptionally dark in general coloration, showing the response to the black muck environment of the red mangrove swamps. In the females, the abdominal color pattern, usually so distinct, has reached the maximum of recession we have observed in this race, the pale spots being wholly obscured and so reduced that only traces of them may be detected with a hand lens. As a result these specimens bear a close superficial resemblance to typical *N. cubensis cubensis,* from which species they are not only separated by several very important characters but also may be further distinguished by the paler and more unicolorous limbs and from the normal condition of that race by the maxillary palpi which in *carolinus* have a great portion of the terminal and penultimate joints very pale. All of the specimens are brachypterous but one of the females from Virginia Key has elongate tegmina. The specimens from Miami Beach are large, the other adults are unusually small excepting two males from Virginia Key which are of medium size. Though abundant locally at Virginia Key, individuals were found to be exceedingly active and difficult to capture, much more so than *Hygronemobius alleni,*[17] but considerable efforts were made to secure a large series owing to the evidently abnormal coloration of the insects.

Anurogryllus muticus (De Geer). Brickell's Hammock, Miami, III, 5 to 15, 1915, (H.; trapped, molasses jar), 1 large juv. ♂.

This species is here recorded from a definite locality in Florida for the first time.

Gryllus assimilis (Fabricius). Musa Isle, III, 4, 1915, (H.; under board in pen), 1 ♂.

This specimen is macropterous and represents the *pennsylvanicus* variant of the species.

[17] This more tropical form may, however, be more decidedly affected by cold weather such as was experienced at the time these specimens were taken.

Gryllodes sigillatus (Walker). The characteristic, very rapid, stridulation of this species was heard in buildings both at Miami Beach and Miami, but no efforts were made to capture specimens.

Anaxipha scia[18] new species (Pl. XX, figs. 3A-3D).

Closely related to *A. vittata*,[19] differing in the uniform dark coloration, proportionately longer and more attenuate limbs and spines of the caudal femora. The tegminal cross-veinlets of the female are also more distinct than in that species or in the closely related *A. pulicaria*.

TYPE: ♀ ; red mangrove swamp on edge of Brickell's Hammock, Miami, Florida, March 16, 1915. (Hebard; among roots above black muck, sodden leaves and tidal litter.) [Hebard Collection, Type No. 404.]

Description of Type. Size small, form rather slender for the genus (similar to that of *vittata* but with limbs proportionately longer). Head, pronotum and ovipositor as in *vittata*. Limbs more elongate and proportionately more slender than in that species. Caudal tibiae with dorsal margins supplied with three pairs of long alternating spines which are all distinctly longer than the spaces intervening between their bases. Distal extremity of caudal femora supplied with three small external and two decidedly larger internal spurs; of the external three the dorsal is so small that it can scarcely be detected with a hand lens, while the median is the longest and about half as long as the ventro-internal, which is about three-fifths as long as the dorso-internal spur (in these characters agreeing with *vittatus* but with tarsi longer). Caudal metatarsus elongate, one and one-quarter times as long as the longest tibial spur and equalling in length the longest tibial spine. Tegmina much as in *vittata* but with cross-veinlets few but distinct; wings not apparent. Coloration distinctive.

Allotype: ♂ ; same data as type excepting date, March 15, 1915.

Description of Allotype. Agrees with type in all characters common to both sexes. Tegmina similar to those of *vittata* and *pulicaria*.

Measurements (in millimeters)

	Length of body	Length of pronotum	Caudal width of pronot.	Length of tegmen	Length of caudal femur	Width of cau. fem.	Length of caudal tibia	Length of caudal metatarsus
Allotype, ♂	5.2	1.1	1.7	4.5	4.7	1.3	4.3	1.
TYPE, ♀	5.2	1.1	1.6	3.3	4.7	1.2	4.4	1.

[18] From σκιά = a shadow. In reference to the dark habitat of this obscure species.

[19] In regard to the generic status of this species, see a full discussion in a forthcoming paper by Rehn and Hebard.

The width of the dorsal field of the male tegmen is 2 mm.; in the female the ovipositor length is 2.7 mm.

Coloration. Identical in both sexes. General coloration of head and pronotum sepia, the ventral portion of the interantennal protuberance marked with a narrow perpendicular median line of a paler shade (Saccardos umber). Antennae, maxillary palpi, tegmina and limbs Saccardos umber, the caudal tibiae mottled on the dorso-external two-thirds with sepia and a small but distinct spot of the same color disto-dorsad on the internal face at the termination of the swollen proximal portion of the limb. Immature individuals before us are similar but have a more distinct color pattern with a narrow medio-longitudinal and broad postocular pale parallel bars on head and pronotum and with the face pale, showing in sepia the normal color pattern found in the allied species of the genus as well.

In addition to the type and allotype, we have an immature pair before us taken in the same place and on the same dates.

This species was found to be exceedingly scarce in a heavy red mangrove swamp, where individuals were located among the roots of these trees in places which at high tide were more than a foot under water. In such dark situations, where no green thing was to be seen, these sombre little insects were found to be so active in their movements that another adult seen was lost while the adult pair secured was taken only through rare good fortune.

Anaxipha imitator (Saussure).[20] (Pl. XX, figs. 4A-4D).

Edge of Brickell's Hammock, Miami, III, 15 and 16, 1915, (H.), 41 ♂, 27 ♀, 3 juv. ♂, 8 juv. ♀, several instars represented.

This species, hitherto known only from Cuba, was found abundantly in the narrow border of sloping ground between the jungle of Brickell's Hammock and the red mangrove swamp. There, on the ground among a litter of the dried leaves of a species of wild coffee, *Psychotria nudata*, individuals were found jumping and flying nimbly about. The insects never flew more than a foot or two from the ground, in flight suggesting numerous species of small tropical roaches. The species appeared to be absolutely limited to this very narrow area which would explain its not being previously known from this region. Immature individuals in all stages and adults were found in about equal numbers. At 11 A. M. on a cloudy

[20] See footnote 19 in re the genera *Anaxipha* and *Cyrtoxipha*, in which latter genus the present species was placed by Saussure.

day with temperature 70°, the few specimens heard stridulating emitted a trilling note, not loud but penetrating; the trills lasting one or one and one-half but occasionally two seconds, with the normal interval between a little less than one second. This song was not nearly as tinkling as that of *Cyrtoxipha gundlachi,* but still pleasant to the ear. Specimens were easily taken owing to the fact that, even if perfectly concealed, they could be easily made to leave their hiding places by stirring about the dead leaves.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of wing	Length of caudal femur
♂.....	5.3-6.2	.9-1.1	5-5.4	7.7-8.6	4.7-5.
♀.....	4.7-5.4	.8-1.1	4.4-4.7	7.4-7.8	4.3-4.7

This species is closely related to the tropical American species *toltecus* and *angusticollis* and is a member of a large group of species of the genus, no other of which is known from the United States.

The most striking features of the species are: the broad lateral bands of dark brown which run from the postocular portion of the head across the lateral lobes of the pronotum and include all of the lateral fields of the tegmina and exposed portions of the wings when at rest; the very long wings in both sexes and very ample tegmina in the male; the short and widely separated spines of the caudal tibiae; the long caudal metatarsus and proportionately very short distal tarsal joints, and the maxillary palpi which have the terminal joint expanding weakly in the proximal half, but strongly in the remaining distal portion.

Cyrtoxipha gundlachi Saussure. Brickell's Hammock, Miami, III, 4 and 5, 1915, (H.; song heard on all sides after dusk, specimens beaten from foliage), 1 ♂, 2 juv. ♂, 1 minute juv. Virginia Key, III, 11, 1915, (H.; heard everywhere through red mangroves and in strand shrubbery, beaten from bushy scrub near strand), 1 ♂, 1 juv. ♀. Cape Florida, Key Biscayne, III, 12, 1915, (heard abundantly in red mangrove and other heavy leaved trees), none taken.

The very pleasant tinkling song of this species is to be heard almost everywhere on warm evenings about Miami.

Hapithus agitator quadratus Scudder. Brickell's Hammock, Miami, III, 3, 4 and 5, 1915, (H.; adults scarce, immature individuals common in luxuriant undergrowth), 3 ♂, 2 ♀, 3 juv. ♂. Virginia Key, III, 15, 1915, (H.; in red mangrove swamp, on sodden leaves among roots), 1 ♀, 1 juv. ♀.

Orocharis saltator Uhler. Fort Capron (Viking), V, 4, 1 ♂, [U. S. N. M.]. South of Brickell's Hammock, Miami, III, 3, 1915, (H.; under bark of live oak in pine woods), 1 ♀. Brickell's Hammock, Miami, III, 4, 1915, (H.; under bark of tree), 1 juv. ♀.

The present species was not previously known from south of Thomasville, Georgia, from which locality it was recorded as *O. gryllodes.* All previous records of *O. gryllodes* from the United States apply to this species.[21]

Orocharis gryllodes (Pallas).

1772. *Gryllus gryllodes* Pallas, Spicil. Zool., Vol. I, fasc. IX, p. 16, Pl. 1, fig. 10. [♂, Jamaica.]

1844. *Platydactylus saulcyi* Guerin, Iconogr. Règne Anim., Ins., p. 330. [♀, Martinique.]

Unfortunately this distinctive West Indian species has been generally recognized as *O. saulcyi,* which name is an absolute synonym of *gryllodes* of Pallas. Not only does a series of Jamaican material before us bear this out, but the original description and figure show conclusively that Pallas' species was not the insect which Saussure determined as *gryllodes.* Saussure's material from the United States and subsequent records of *gryllodes* from this country have all applied to *O. saltator* Uhler.

Fort Capron (Viking), IV, 15, [U. S. N. M.]. Miami, III, 4, 1915, (H.; small colonies in shrubbery and also in trees about hotels, taken at night), 1 ♂, 2 ♀. Brickell's Hammock, Miami, III, 3, 4 and 15, 1915, (H.; under bark of *Exothea paniculata* and *Coccolobis laurifolia*), 3 ♂, 5 ♀, 2 juv. ♂, 2 juv. ♀; 3 very small juv. (these latter beaten from low vegetation in openings of jungle).

The song of this insect was, next to that of *Cyrtoxipha gundlachi,* the most frequent sound heard on warm evenings. The note is resonant, bāāāāā', repeated incessantly at irregular intervals of a few seconds. When singing, the males were found perched upon the leaves of heavy bushes with tegmina raised high above their backs; considerable difficulty was experienced in locating individual singers.

Tafalisca lurida Walker. Brickell's Hammock, Miami, III, 3, 1915, (H.; beaten from luxuriant undergrowth), 1 small juv.

[21] This species will be fully discussed in a forthcoming paper by Rehn and Hebard.

EXPLANATION OF PLATE XX.

Fig. 3A. *Anaxipha scia* new species. Miami, Fla. Male (*allotype*). Dorsal outline. (X4).

Fig. 3B. *Anaxipha scia* new species. Miami, Fla. Female (TYPE). outline. (X4).

Fig. 3C. The same. Lateral outline of caudal limb, internal. (Greatly enlarged.)

Fig. 3D. The same. Lateral outline of ovipositor. (Greatly enlarged.)

Fig. 4A. *Anaxipha imitator* (Saussure). Miami, Fla. Male. Dorsal outline. (X4).

Fig. 4B. *Anaxipha imitator* (Saussure). Miami, Fla. Female. Dorsal outline. (X4).

Fig. 4C. The same. Lateral outline of caudal limb, internal. (Greatly enlarged.)

Fig. 4D. The same. Lateral outline of ovipositor. (Greatly enlarged.)

The Number of Generations per Year of the Mud-Daubers (Hymen.).

By PHIL RAU, St. Louis, Mo.

The two species of the mud-daubing wasps, *Sceliphron* (*Pelopoeus*) *caementarium* and *Chalybion coeruleum* certainly have two generations a year and perhaps three.

If we gather the nests during the winter, the young under natural conditions, never emerge before May or June. They hibernate in the prepupal stage, and while their life cycle is long, from September or even August, until June, they pass through the same development as the summer brood. There is no apparent difference between the adults that have gone through the long and the short periods of development. We have never found any of these insects hibernating as adults, nor have we ever seen an adult after the first of October.

August is usually the dividing line of the year. Nests taken in the early part of August give forth their adults in the same or in the following month; those taken in the latter part of the month give forth their adults the next year in May or June. The table below is compiled from notes on nests taken at this critical period:

Sceliphron caementarium.

Nest taken.	Date of emergence.	No. of insects.
August 11, 1910.	August 18, 1910	1
August —, 1910.	September, 1910	2
August 21, 1911.	June, 1912	3
August 21, 1911.	June, 1912	3
August 21, 1911.	June, 1912	1
August 21, 1911.	June, 1912	2
August 21, 1911.	June, 1912	9
August 21, 1911.	June, 1912	5
August 21, 1911.	June, 1912	1
August 21, 1911.	June, 1912	1
August 21, 1911.	June, 1912	2
August 21, 1911.	June, 1912	3
August 20, 1909.	June 22, 1910	2
August 23, 1911.	June, 1912	1
August 21, 1911.	June 20, 22, 1912	2
August 21, 1911.	June 22-28, 1912	3
August 21, 1911.	June 24, 1912	1
September 10, 1911.	June, 1912	5
September 10, 1911.	June, 1912	3

Chalybion coeruleum.

August 21, 1911.	June, 1912	4
August 21, 1911.	June, 1912	1

This is evidence sufficient to show that about August 21, or a little before (since the above dates are when the nests were taken and not when constructed), is the date when eggs then deposited are destined to give adults in the spring. We are sure that temperature is an important factor controlling the time of hibernation, since cocoons removed from the nests in January and kept in the living room gave forth their adults in March.

It would be interesting to find whether it is possible to get the winter brood (that is the eggs deposited in August or September) to emerge in September or October by placing them in an incubator. Those which normally emerge in August or September must necessarily be destined to short lives and probably have insufficient longevity to build and oviposit completely.

A problem of equal inerest in this connection is whether the insects of the first generation carry a greater number of eggs than those of the last generation, in order that they may utilize the summer to the benefit of the race.

We have found that all of the wasps that hibernate in the cells, emerge in May or June; they begin nesting almost at once.

Hence when wasps emerge in July, we know that they are the second brood. We have the following data on the subject:

Sceliphron caementarium.

Nest taken.	Date of emergence.	No. of insects.
June 21, 1911.	July 13, 1911	1
June 21, 1911.	July 8 to 11, 1911	5
June 19, 1912.	July 5 to 14, 1912	6
July 5, 1910.	July 28 to 31, 1910	4

Chalybion coeruleum.

June 21, 1911.	July, 1911	3
June 21, 1911.	July, 1911	1
June 21, 1911.	July, 1911	1
June 21, 1911.	July 10, 1911	1

The two tables above show that the first summer generation goes through its life cycle in less than a month. Hence one can see no reason why, under the same climatic conditions, we should not have another generation following this, covering the July-August period, and this third generation leave behind them the young which hibernate.

It would be very difficult to solve this problem precisely, since in the latter part of the summer the wasps of all the generations are mingled in their work.

Synonymical Notes (Lep.).

In a paper on New Heterocera by Frank Haimbach, which appeared in the Entomological News, Vol. XXVI, p. 321, 1915, the author has unfortunately created several synonyms of Western species, owing to the fact that some recently published papers by Dr. Dyar and ourselves have been apparently overlooked.

Hymenia kaeberalis Haim. is a synonym of *Ercta desmialis* B. & McD. (Cont. N. Hist. N. Am. Lep. II (6) 225, 1914).

Diathrausta montana Haim. falls before *Diathrausta harlequinalis* Dyar (Insecutor Insc. Menst. I, p. 100, 1913).

Galasa fulvusana Haim. is the same species as *Cordylopeza nigripunctalis* B. & McD. (Cont. N. Hist. N. Am. Lep. II, (3) p. 134, 1913).

Regarding *Pyrausta huachucalis* Haim. we are in doubt, but as far as can be judged by the figure the species looks suspiciously like a Chrysaugid, *Heliades mulleolella* Hlst., which is in Dr. Dyar's list wrongly placed as a synonym of *Arta statalis* Grt. An examination of the venation should of course at once settle the question as to whether the species is a Chrysaugid or a Pyraustid and we should be glad to hear from Mr. Haimbach on the subject.

Amorbia wenzelana Haim., described from a single ♀ should be transferred to the genus *Platynota*. The species is closely allied to *nigrocervina* Wlshm. and has been standing in the Barnes collection under a manuscript name of Kearfott's; this never having been published, *wenzelana* Haim. will of course replace it.—J. McDUNNOUGH, PH.D., Decatur, Illinois.

ENTOMOLOGICAL NEWS.

PHILADLPHIA, PA., DECEMBER, 1915.

The Financial Status of Scientific Journals.

There are over a hundred journals and proceedings devoted to the publication of research work in America, not one of which pays its expenses on a regular business basis....Indirectly they are now subsidized by the work of contributors and editors supported by endowed or tax-supported institutions and by subscriptions to public libraries.—*Popular Science Monthly*, Vol. 87, p. 311.

ENTOMOLOGICAL NEWS has been conducted for twenty-six years on what we considered a self-supporting basis—that is, the expenses of publication have always been covered by the subscriptions and advertisements—but under the definition given in the *Popular Science Monthly* it may not be considered to be conducted on a business basis.

The only person to receive pay is the printer. To be on a "business basis" the editors, advisory committee and contributors should be paid and the journal should not be sold to any institutions tax-supported or endowed. This appears to be the money age and money is considered necessary for all scientific work. As a matter of fact, money, up to date, has been largely a failure as a factor in the advancement of science, as the great discoveries have been made without its help. On the other hand, an immense amount of poor and useless work has been subsidized by money.

The true advance will be made in spite of every obstacle and it yet remains to be proven that money is not largely a failure as a *sine qua non* in science and natural history.

ENTOMOLOGICAL NEWS then is not on a "business basis" and not likely to be in the near future; yet it manages to do what some of our friends consider excellent work for entomology. —H. S.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Parasite of Bellura obliqua G. and R. (Lep., Dip.)

Many larvae of *Bellura obliqua* have been collected by myself and by other collectors in the vicinity of Newark for many years without finding any trace of parasites. Last winter I collected about forty larvae of this species at Cliffwood, New Jersey, which lies beween South Amboy and Keyport and is about 25 miles from Newark, south on the Raritan Bay. When the larvae were collected they did not show any sign or trace of being parasitized and they kept alive without showing any sign until the middle of May, which is about two weeks longer than any of the larvae which were collected in the vicinity of Newark have ever taken to pupate. On the 17th of May, three dead larvae were found in the cage and on examining them it was noticed that a parasite had done its deadly work. Dead larvae were found every day thereafter until the number reached twenty-nine out of the forty, showing about seventy-five per cent. parasitized.

The larvae of the parasite, which turned out to be *Hypostena tortricis* Coq., eat out the substance of the host until only the skin is left and in some cases eat through a part of the skin. Some leave the host while others pupate within the skin of the dead host.

It seems almost impossible for parasites of this order to reach the larvae of *obliqua* as this species feeds in *Typha* (Cat-tails), but it cannot be a hard task, as so many are attacked, but another peculiarity is that this parasite should be so abundant in one place and unknown in others.—HERMAN H. BREHME, Newark, New Jersey.

Corthylus punctatissimus Zimm. in New Jersey (Col.).

This insect, known as the "Pitted Ambrosia Beetle" and recorded in "Insects of New Jersey" from Eagle Rock and Cape May, was found September 8th, at Somerville, N. J., where it was infesting *Rhododendron maximum, Kalmia latifolia* and *Azalea mollis*. The work of the insect is indicated by a yellowing and wilting of the leaves, followed by the complete death of the plant. The dead shoots break off easily near the ground where the insects always work. According to Dr. E. P. Felt, who gives an account of this species in the 29th Report of the State Entomologist of New York, Museum Bull., 175, the beetles enter the side of the stem near the ground. Once inside, numerous horizontal galleries and vertical brood chambers are constructed, which, of course, weaken the stem. In one infested azalea stem collected at Somerville on the above date, fifteen adults and three pupae were found. The operations of the insect appear to be confined mostly to plants growing in shaded situations where there is an abundant mulch, and this was true of the infestation at Somerville. Mr. E. A. Schwarz, who studied the pest in huckleberries, states that the beetles are probably subterranean, appearing only rarely above ground. Other recorded food plants are sugar maple, sassafras, dogwood, hazel, huckleberry, water beech, ironwood, rhododendron. The only remedy is to cut and burn infested stems, taking care that they do not break off at the point of injury and allow some of the beetles to escape.—HARRY B. WEISS, New Brunswick, N. J.

The Entomological Society of America: Announcement of the Ninth Annual Meeting.

The ninth annual meeting of the Entomological Society of America will be held in Columbus, Ohio, Wednesday and Thursday, December 29 and 30, and on Friday morning, December 31, if the number of papers be sufficient to warrant it, in affiliation with the American Association for the Advancement of Science and other societies. Meetings will begin at 2.00 P. M. on Wednesday. The meetings of the American Association of Economic Entomologists will begin Monday afternoon with other meetings on Tuesday and Wednesday and Thursday morning.

The by-laws provide that there shall be held at the annual meeting a technical exhibit of entomological materials and methods. Any photographs, drawings, specimens, novelties, apparatus, or other matter of interest to entomologists will be heartily welcomed. This exhibit will remain open during the entire period of the meetings, for the examination at their leisure, of those interested. The exhibit will be under the charge of the local representative of the Society. Ship packages to Prof. J. S. Hine, Ohio State University, Columbus, O.

The annual business meeting will be held Thursday morning, December 30th, for the reports of the executive committee, the treasurer, the auditing committee, the election of new members, the election of officers, and the transaction of all other business.

The Annual Public Address will be given on Wednesday evening, December 29th, by Dr. C. Gordon Hewitt, Dominion Entomologist. Subject: "A Review of Applied Entomology in the British Empire." The entomologists of Ohio are planning a smoker for the visiting entomologists, which will be held probably immediately after the address.

It is impossible to give any information at this date as to whether reduced fares will be available to Columbus or not. Practically all ticket agents are provided with tariff regulations and can tell whether convention rates are available or not. You should inquire of your ticket agent if reduced rates are available and if the certificate form of ticket is used the following should be noted:

1. Tickets at full fare for the GOING journey may be secured within three days (exclusive of Sunday) prior to and during the first three days of the meeting. The advertised dates of the meeting, A. A. A. S., are December 27, 1915 to January 1, 1916.

2. Present yourself at the railroad station for ticket and certificate at least thirty minutes before departure of the train.

3. Certificates are not kept at all stations. If you inquire at your station you will find out whether certificates and through tickets can be obtained to the place of meeting. If not obtainable at your home

station, the agent will inform you at what station they can be obtained. You can in such case purchase a local ticket thence, and there purchase through ticket and secure certificate to place of meeting. Be sure that when purchasing your going ticket, you request a *certificate. Do not make the mistake of asking for a receipt.*

A fee of 25 cents will be charged at the meeting for validating your certificate. No refund of fare will be made on account of failure to have certificate validated.

The hotel headquarters for the members of the Entomological Society of America will be the Southern Hotel, corner Main & S. High Streets. The prices for rooms only, per day are as follows: single rooms, one person, without bath, $1.50 and up; with bath, $1.50 and up.

ALEX. D. MACGILLIVRAY, *Secretary-Treasurer.*

VERNON L. KELLOGG, *President.*

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

2—Transactions of the American Entomological Society, Philadelphia. **4**—The Canadian Entomologist. **6**—Journal, New York Entomological Society. **8**—The Entomologist's Monthly Magazine, London. **9**—The Entomologist, London. **11**—Annals and Magazine of Natural History, London. **12**—Comptes Rendus, L'Academie des Sciences, Paris. **13**—Comptes Rendus, Societe de Biologie, Paris. **15**—Biologia Centrali-Americana, Zoology, London. **16**—Bulletin, Societe Nationale d'Acclimation de France, Paris. **21**—The Entomologist's Record, London. **22**—Zoologischer Anzeiger, Leipzig. **36**—Transactions, Entomological Society of London. **45**—Deutsche Entomologische Zeitschrift. **74**—Naturwissenschaftliche Wochenschrift, Berlin. **84**—Entomologische Rundschau. **89**—Zoologische Jahrbucher, Jena. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **97**—Zeitschrift fur wissen-

schaftliche Zoologie, Leipzig. **102**—Proceedings, The Entomological Society of Washington. **122**—Transactions of the City of London Entomological and Natural History Society. **166**—Internationale Entomologische Zeitschrift, Guben. **176**—Archiv fur entwicklungsmechanik der Organismen, Leipzig. **179**—Journal of Economic Entomology. **180**—Annals, Entomological Society of America. **184**—Journal of Experimental Zoology, Philadelphia. **186**—Journal of Economic Biology, London. **189**—Journal of Entomology and Zoology, Claremont, Calif. **223**—Broteria. Revista de Sciencias Naturaes do Collegio de S. Fiel. (Ser. Zoologica). **285**—Nature Study Review, Ithaca, N. Y. **292**—Acta Universitatis Lundensis (nova series). **313**—Bulletin of Entomological Research, London. **324**—Journal of Animal Behavior, Cambridge. **342**—Pennsylvania Health Bulletin, Harrisburg. **368**—The Monthly Bulletin of the State Commission of Horticulture, Sacramento, California. **369**—Entomologische Mitteilungen, Berlin-Dahlem. **392**—The Irish Naturalist, Dublin. **411**—Bulletin, The Brooklyn Entomological Society. **477**—The American Journal of Tropical Diseases and Preventive Medicine, New Orleans. **485**—Journal of the Royal Microscopical Society, London. **491**—Transactions of the American Microscopical Society, Decatur, Illinois. **503**—Boletin Sociedad Physis, Buenos Aires. **509**—Revue Generale des Sciences pures et Appliquees, Paris.

GENERAL SUBJECT. Ballou, H. A.—Observations on insect pests in Grenada, **313,** vi, 173-181. **Blair, K. G.**—Notes from the Trenches, **21,** 1915, 199-200. **Brakeley, J. T.**—Obituary by R. P. Dow, **411,** x, 84-6. **Cockerell, T. D. A.**—Sunflower insects, **4,** 1915, 280-2. **Cooley, R. A.**—Comments on organization in agricultural college extension work in economic entomology, **179,** viii, 442-49. **Davis, W. T.**—Long Island collecting notes, **411,** x, 79-82. **Dow, R. P.**—The first insects in the world, **411,** x, 69-73. **Lameere, L.**—L'origine des Societes d'insectes, lecon faite au Museum d'Histoire Naturelle de Paris, **509,** xxvi, 459-64. **Marschner, H.**—Naturdenkmaler auf dem gebiete der entomologie, **45,** 1915, 429-33. **Weiss, H. B.**—Some curious old beliefs about insects; The insect fauna of the N. J. Coast, **4,** 1915, 277-9, 308-9.

PHYSIOLOGY AND EMBRYOLOGY. Morgan, T. H.—The predetermination of sex in Phylloxerans and Aphids, **184,** xix, 285-322. **Stellwaag, F.**—Ueber das biogenetische grundgesetz im leben der insektenstaaten, **74,** xiv, 426-7. **Strindberg, H.**—Ueber die bildung und verwendung der keimblatter bei Bombyx mori; Embryologisches ueber Forficula auricularia, **22,** xlv, 577-97; 624-631. **Sturtevant, A. H.**—Experiments on sex recognition and the problem of sexual selection in Drosophila, **324,** v, 351-66.

MEDICAL. Anon.—Flies as a factor in infant mortality, **342,** No. 69. **Mitzmain, M. B.**—An experiment with Stomoxys calcitrans in an attempt to transmit a filaria of horses in the Philippines, **477,** ii, 759-63.

ARACHNIDA, ETC. Banks, N.—(See under Hymenoptera). **Barber, H. S.**—Migrating armies of Myriopods; Fragmentary notes on the life-history of the Myriopod, Spirobolus marginatus, **102,** xvii, 121-3; 123-6. **Diguet, L.**—Nouvelles observations sur le mosquero ou nid d'Araignees sociales, **16,** 1915, 240-9. **Hirst, S.**—On some new Acarine parasites of rats, **313,** vi, 183-90.

Marshall, R.—American species of the genus Atractides [3 n. sps.], **491,** 1915, 185-8. **Mello-Leitao, Dr.**—Alguns generos e especies novas de Araneidos do Brasil, **223,** xiii, 129-44.

NEUROPTERA, ETC. Banks, N.—(See under Hymenoptera). **Hood, J. D.**—Two new sps. of Liothrips (Thysanoptera), **411,** x, 76-9. **Kennedy, C. H.**—Interesting western Odonata, **180,** viii, 297-303. **Lizer, C.**—Trois insectes parasites des plantes nouveaux pour l'Argentine et leur distribution geographique, **503,** i, 569-72. **Marshall, W. S.**—The formation of the middle membrane in the wings of Platyphylax designatus, **180,** viii, 201-20. **Natzmen, G. V.**—(See under Hymenoptera). **Wallengren, H.**—Physiologisch-biologische studien ueber die atmung bei den Arthropoden. III. Die Atmung der Aeschnalarven, **292,** x, No. 8, 28 pp.

Dohler, W.—Die aussereuropaischen Trichopteren der Leipziger Universitats-Sammlung, **45,** 1915, 397-412. **Hood, J. D.**—An interesting case of antennal antigeny in Thysanoptera [1 n. gen.], **102,** xvii, 128-32. **Longinus Navas, R. P.**—Neue Neuropteren, **369,** iv, 194-202.

ORTHOPTERA. Bordage, E.—Phenomenes histolytiques observes pendant la regeneration des appendices chez certains O., **12,** 1915, 155-9. Sur les differences d'aspect du tissu adipeux produit par histolyse chez certaines O., **13,** clxi, 248-52. **Schleip, W.**—Ueber die frage nach der beteiligung des nervensystems beim farbenwechsel von Dixippus, **89,** xxxv, Abt. Z, 225-32. **Weiss, H. B.**—Gryllotalpa gryllotalpa, the european mole cricket in N. J., **179,** viii, 500-1.

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324, v, 381-90; 397-402. **Kotinsky, J.**—The Bermuda grass Odonaspis, **102,** xvii, 101-4. **Leonard, M. D.**—The immature stages of Plagiognathus politus and Campylomma verbasci, **6,** xxiii, 193-97.

Baker, A. C.—On the early history and scientific name of the woolly apple aphis (Erisoma lanigera), **186,** x, 53-64. **Davis, W. T.**—A new variety of Cicada resembling C. dorsata, **6,** xxiii, 161-4. **Essig, E. O.**—Aphididae of California, XI. [1 n. sp.], **189,** vii, 180-200.

LEPIDOPTERA. Burgeff, H.—Zur frage des totens der Zygaenen, **216,** xxix, 49-50. **Chapman, T. A.**—Lepidopterology, **21,** 1915, 202-5. **Cockayne, E. A.**—Gynandromorphism, **122,** 1914, 75-85. **Davis, F. L.**—The larva and pupa of Caligo memnon, **36,** 1915, 198-200. **Floersheim, C.**—Some notes on the Papilionids, **9,** 1915, 225-9 (cont.). **Frohawk, F. W.**—Hibernated examples of Vanessa antiopa, **9,** 1915, 242-3. **Fruhstorfer, H.**—Das mannliche copulationsorgan als hilfsmittel zum artnachweis in der gattung Calapoecilma, **92,** xi, 220-2. **Kincaid, E.**—The effect of color on the thistle butterfly, **285,** xi, 340-1. **Maas, O.**—Versuche ueber umgewohnung und vererbung beim seidenspinner, **176,** xli, 672-727. **Newman, L. W.**—Notes on breeding and collecting the "Sesia," **122,** 1914, 43-8. **Prell, H.**—Ueber die beziehungen zwischen primaren und sekundaren sexualcharakteren bei schmetterlingen, **89,** xxxv, Abt. Z. & P., 183-224. **Rowley & Berry**—The 1914 record of Catocalae and other L., **4,** 1915, 303-7. **Stephan, J.**—Einige kurze bemerkungen ueber die "Grossschmetterlinge der Erde," **84,** xxxii, 52-3. **Turner, H. J.**—"A Poser," Stainton (Agrotis lunigera versus A. trux), **21,** 1915, 192-99 (cont.). **Vickery, R. K.**—Evidence of a protoplasmic network in the oenocytes of the silkworm, **180,** viii, 285-90.

Barnes & McDunnough—Notes on some recently described species of N. A. Lep., **4,** 1915, 282-4. **Meyrick, E.**—Descriptions of So. American Micro-L., **36,** 1915, 201-56. **Niepelt, W.**—Neue formen exotischer tagfalter; Neue sudamerikanische Papilioformen, **166,** ix, 58; 70. **Turner, H. J.**—Celastrina argiolus in America, **21,** 1915, 210-11. **Walsingham, Lord**—Heterocera, **15,** Pt. ccxv, 425-82.

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